WHITE PAPER

Analytics in the DC

From "What Happened?" to "What's Coming?"



There may be no hotter topic in business than “big data,” a term that refers to the collection of huge data sets on previously inaccessible or unrecordable aspects of a process or operation; data sets that can cover — literally — everything, up to the instant. These data sets are so large that they are difficult to process with traditional methods, so effectively extracting value from them and using those insights to improve warehouse planning and operations can appear overwhelming.

“‘Big Data’ is high-volume, -velocity and -variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making.” — Gartner, The Importance of ‘Big Data’: A Definition, 2012

All facets of business operations can benefit from the use of big data, including inside the distribution center (DC). From long-term, strategic network planning to weekly labor requirements to day-to-day operational metrics, advanced analytics play a key role. Unfortunately, there’s a lot of hype that’s misleading, because having mountains of data simply isn’t enough. In order to extract and make sense of the considerable value locked within these massive data sets, visualize the insights in a meaningful way and put them to use, the appropriate software must be brought to bear.

Looking Back to Move Ahead — “What Happened?”

For companies not yet using advanced analytics to fully leverage their data, the irony is that the process to start moving toward that goal is rooted in effective traditional operations analysis and network planning.

Having robust historic data and performing proper analysis to find past patterns and trends in order to make projections for planning a distribution network has always been crucial, when looking at making improvements or additions. Companies position themselves for success when the proper rigor is used to identify the key metrics needed to properly determine future needs and then plan accordingly.

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- ***Do you have sufficient available pick locations as your business and SKU count expand?***
- ***Are pick locations and zones set up correctly for both the types of products currently being fulfilled and future product introductions?***
- ***Is cost per unit handled increasing? If so, is the cost increase due to a changing business, such as rapidly growing e-commerce channel, or increased provision of labeling and other value-add services?***
- ***Do you have sufficient docks for current and projected volume?***
- ***Are you shipping a significant volume of product to distant ZIP codes and need to consider opening a new DC?***
- ***Is growth tracking against projections?***

These types of questions and many more are considered and addressed in the formal planning phase preceding any investment in a new or existing DC. Thorough analysis of historical data forms the invaluable foundation of this process, creating an essential baseline against which to measure future performance.

The Need for Connected Warehouse Software

While it's often the case that the back end of a business — including logistics and warehouse operations — lacks the attention that the front office receives, advanced data collection, analysis and analytics are as relevant here as anywhere. What's more, moving into business intelligence best practices isn't something exclusive to the "big boys." Warehouse software can be implemented to take your company from asking "What happened?" to answering "What's coming?" at many different levels, whether you want to know for the next shift, for the next season or for the next five years.

Companies need only look to modern warehouse software, such as warehouse execution software (WES), and its advanced analytical capabilities, as they invest in their distribution operations in order to harness the full potential of their data. By bringing advanced analytics into their operation, they position themselves not only to tease out more of the valuable trends and patterns in historical data, but to begin to use their data and cutting-edge analytical methods to look forward, to predict what's in store for their business.

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Unfortunately, the sheer volume of data that can now be collected invites essentially limitless analytical approaches and creation of endless graphs, charts and plots; therefore, it's not sufficient to simply throw software at the data. Knowing what to analyze, what other business systems need to be connected to the analytics and how to use the results can be the most critical factors in avoiding "paralysis by analysis" and significant waste of capital. The data alone is of little value without the implementation of the right analytics and visualization through the right software.

In their Logistics Trend Radar Report, DHL Trend Research cites, "Big data carries huge untapped potential for optimizing capacity utilization, reducing risk, improving customer experience and creating new business models." The good news is that the software is available to connect all of your business systems to your warehouse operations, to collect and analyze your data to deliver the value locked within.

Strategically, limitations on the scope of the data set can make it hard to identify long-term trends, by not analyzing data far enough in the past and/or by not including real-time data. A company could be looking at a subset of the overall performance metrics that indicate an issue that looks systemic, but may be an aberration, due to something that's not included in the limited data set. Accordingly, the organization that is currently collecting and storing historical data will have a more substantial base from which to move forward to predictive analytics.

Real-time Visibility — "What's Happening?"

Many businesses today have some level of visibility into various aspects of their current operation in real time inside the DC. Moving from this limited picture to having access to real-time data from all relevant business systems feeding the right warehouse software develops the complete picture of an operation and provides very relevant information for operational decisions during the course of a shift or workday.

- ***Is inability to keep pace with pick-face replenishment tasks for fast movers causing orders to back up in a pick zone?***
- ***Is a problem with the labels at manifesting causing a delay in shipping?***
- ***Are zones with insufficient orders to pick hurting productivity and limiting overall throughput capacity?***
- ***Are we tracking against projections for today's shipments to meet customer requirements?***

At a tactical level, using real-time data analytics enables you to move on issues as they occur, preventing small problems from getting out of hand — but not until you see the issues arise. Real-time data means, at best, a real-time reaction to a real-time issue. It's valuable, but it's reactive by nature. Any predictive actions to try to correct for coming issues are based solely on the experience of the operations team, which must be watching the system in order to notice the indicators of the impending situation. There's no predictive ability built into the systems in the DC as an integral part of the operational solution.

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As a simple example of a potential shortcoming of real-time data visibility without predictive analytics, a real-time dashboard can provide up-to-date information about the status of orders that must ship that day by a specific carrier cutoff time. While this real-time status is valuable to understand, it could look like the orders will make the cutoff; but the replenishment status of SKUs in those orders could indicate an impending problem, when the otherwise smooth operation grinds to a halt when replenishment tasks begin overwhelming the staff and pick locations run dry.

At this tactical level, in any given DC, there are hundreds to thousands of these types of dependencies between metrics that can be tracked in real time; but if the logic and rules aren't built in to the distribution operations to properly connect the dots, you can only react when issues arise.

For strategic business planning, adding real-time data to the store of historic information greatly improves the business intelligence that can be gained through ongoing analysis of operational effectiveness. This better positions the business for strategic decision-making and investments, but there's still more value to be pulled from the data. Without moving fully into predictive analytics, there is potential for missing connections between different influences on operations that could be addressed in order to better prepare for their combined effect, when it arises.

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For instance, real-time data allows tracking against forecast from projections generated, using past patterns; adjusting workload balance and staffing to maintain productivity; checking performance to standards minute to minute; and more. All of these can drive productivity across the DC and allow for course correction more quickly as conditions change, but they remain reactive.

The good news is that having solid historic and real-time data visibility are key to taking the next step into predictive analytics.

Predictive Analytics — "What's Coming?"

Predictive analytics may seem cutting edge for a DC, but they're far from new. The application of tested and common data science approaches is being used by many businesses in all aspects of operations, including the warehouse, to provide significant value in preparing for what's coming down the line. From tactical operations inside the warehouse, where issues are avoided entirely by proper preventive process adjustments, to strategic planning with invaluable insights to the most critical factors affecting productivity and growth, layering predictive analytics via modern warehouse software on top of thorough and efficient data collection prepares a business for the future.

Intelligence that affects everything from the minutiae of how a specific order is handled to the highest-level strategic decisions of a business can be built into DC operations.

Inherently proactive, predictive analytics are the most effective option for uncovering and maintaining new efficiencies, by looking at the big picture for trends that aren't otherwise visible with limited data sets and traditional analytics. What warehouse manager wouldn't want the ability to correct a problem before it hits?

Once implemented, the power of predictive analytics is immense, when properly connected to other business systems. Intelligence that affects everything from the minutiae of how a specific order is handled to the highest-level strategic decisions of a business can be built into DC operations. The types of best practices that can and should be implemented to arrive at a robust metrics/intelligence program include:

- ***Operational intelligence***
- ***Performance dashboards***
- ***Reporting centers***
- ***Predictive analytics***
- ***Simulations***
- ***Artificial intelligence or machine learning***

On the tactical level, with order detail provided from the WMS or ERP, instead of simple routing instructions, predictive analytics can streamline operations and allocate effort in the DC by:

- ***Intelligently selecting orders for release, based on logically determined rules, to optimally balance operational objectives, such as on-time shipping, workload balance across pick zones, smoothing of replenishment activity, etc.***
- ***Directing replenishment according to pending orders and adjusting staffing levels accordingly***
- ***Allocating labor in the DC, by analyzing the coming orders, to determine what pick zones will be hit***
- ***Using simulation to test what would happen upon wave release, allowing the wave to be adjusted and retested until it is optimized, before the wave is released for picking***

Ultimately, the day-to-day impact of effective predictive analytics implementation is that the DC is able to get the necessary work done as efficiently as possible, all day, every day.

- ***Can you optimize order release to the floor, to balance flow through the distribution center and effectively leverage material handling equipment?***
- ***Can you deploy staffing today, to maximize capacity and reduce cost?***
- ***Can you finish a shift's orders in 6 hours instead of 8, enabling you to get ahead on tomorrow's tasks?***

Connecting the Right Systems Pays Off

Effective warehouse software designed to deliver predictive analytical capabilities does require integration with other business systems outside of the DC to build the complete analytical picture. For example, combining typical operational data from the DC with information from time-card, financial and forecasting systems makes for a robust picture of everything from labor usage to ROI on DC investments in real time. As with any improvements in a DC, careful thought with an eye to future deployment of a complete warehouse software system during planning phases can lead to efficiencies in implementation and smooth the road for creation of a best-of-breed system.

Looking at the impact of predictive analytics implemented through fully connected warehouse software on strategic decision-making, there are a number of illustrative examples.

1. **Warehouse software can look at how predicted order patterns, on top of current orders, will impact staffing, to provide predictive labor-utilization metrics to direct staffing decisions. Projections become more effective; and tracking against those projections enables more effective adjustments, based on predicted operations informed with real-time data.**

2. **Businesses with multiple DCs can gain additional visibility into how effectively their warehouses are being used, by determining if orders are shipping from the proper sites. Often, businesses using multiple DCs are not effectively handling inventory management, so orders end up split between two DCs, increasing shipping costs. Predictive analytics can be used to find patterns of inefficiency like this and uncover the best options for correcting the situation.**

3. **From the earlier example, companies can go beyond just analyzing ZIP codes from past orders during major network-planning efforts and move to continually reviewing ship-to addresses and associated shipping weights, to evaluate if there are sufficient shipments over a critical mileage point to justify looking at a new DC or other tactical/strategic methods to reduce long-distance transportation costs.**

4. **Network evaluation can be conducted continuously, based on such factors as shipping locations, throughput, e-commerce/wholesale mix and growth, with an ongoing centroid analysis that identifies the center of gravity and watches for significant variances that indicate a need to look at potential adjustments. The analysis can be done on multiple levels: SKU, product category, customer/channel or e-commerce vs. wholesale.**

5. **Companies with an e-commerce channel can simulate the effect of an e-commerce promotion on the DC, to see how effectively additional orders will be processed from replenishment through to shipping, allowing issues to be handled before they become a problem. These types of simulations position the company to best profit from sales and other marketing activities.**

This is just a sample of the myriad ways that warehouse software can put your business ahead of the curve with predictive analytics.

It's Time to Look Ahead

More businesses are diving into predictive analytics via warehouse execution software, in order to derive the most business intelligence and value possible from their operations. Predictive analytics are here to stay. It's simply a question of how quickly a business implements them and how well they integrate their business systems to develop the most robust program possible, as soon as possible.

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With that said, there's still a competitive edge over late adopters, and the value to the business is too great to be ignored. Implementation of advanced, connected WES leveraging predictive analytics has not yet become commonplace.

The 2014 18th Annual Third-Party Logistics Study found that big data initiatives have been implemented in only 8 percent of shippers' supply chains; and only 22 percent currently plan such initiatives. It's clear that with only a small percentage of companies getting on board with these advanced analytical implementations, there's ground to be gained.

Are you looking at real-time data as "good enough"?

How much more smoothly would your DC run, if you saw and corrected problems before they happened?

What if you could continually optimize operations, based on what you knew was coming next?

To get the most out of your existing warehouse or any future investments, you have every reason to move your business from asking "What happened?" to "What's coming?"

Why FORTE

Single-Source Accountability

Whether we're helping you develop a strategic plan, design and build a distribution facility, or optimize a distribution operation through performance metrics and analytics, FORTE provides a true single point of contact responsible for the complete performance of your distribution network. No finger pointing. No fragmentation of responsibility. No multiple suppliers for technical support. You have performance goals, and it's our job to make sure they're met on an ongoing basis.

Total Objectivity

We don't manufacture equipment. We don't develop WMS software. We don't have commercial arrangements with any suppliers for expected volumes of business. We're simply interested in delivering the most efficient distribution solutions at the lowest total cost. Our client-side service approach means our only allegiance is to our customers. So with every engagement, you know we'll choose the most appropriate level and blend of technologies integrated into an effective operational system.

Expertise

Our team is deeply rooted in the hands-on implementation of distribution center design and warehouse automation. FORTE's engineers and technicians integrate today's best practices in supply chain management and distribution center operations while developing next-generation technologies. As a result, our solutions employ the best combination of practical advice, data-driven analysis and technology-enabled systems. With FORTE, you get:

- More accountability than a consultant
- More experience than a systems integrator
- More objectivity than a manufacturer

That's why the world's fastest-growing companies are making distribution their FORTE.